

WDFW Intertidal Forage Fish Spawning Habitat Survey Protocols

Procedures for obtaining bulk beach substrate samples

Field materials needed:

Measuring tape (100+ feet)
16-ounce plastic jar or large scoop
8 inch x 24 inch polyethylene bag (or large, sturdy ziplock)
Handheld GPS device
Tide table
Digital camera (optional)
Hypsometer (if available)
Data sheet (preprint on Write-in-the-Rain paper if possible)

Note: Sampling should occur on the lowest tide practicable. Prior to sampling any site consult tide tables to ensure you will be able to access the +7-9 (surf smelt) and +5-8 (sandlance) tidal height. It may also be necessary to obtain **permission to access the beach** from private or corporate landowners.

Procedure:

1. Upon arriving on the beach, fill out the header information on the attached data sheet. *Do not* fill in “Reviewed by.” Before conducting the first sample, describe the character of the upland and beach environment using the codes provided on the back of the data sheet. For additional details on sample codes see Moulton and Penttila (2001)*.
2. Identify a landmark from which you will measure the distance to the bulk substrate sample tidal elevation. Typical landmarks include the upland toe of the beach, the last high tide mark or wrack line, and the edge of the water.
3. Measure the distance from the landmark to the tidal elevation to be surveyed. Note that linear measurements along the beach face serve as an index of tidal height but do not directly quantify *vertical* tidal height. If available, a hypsometer can be used to measure vertical sampling height.
4. Stretch a measuring tape at least 100 feet along the selected tidal height. Note that beach contours may cause the landmark to be ‘wavy’ and that the tape should remain a consistent distance from the landmark.
5. Standing at one end of the measuring tape, record a GPS fix on the data sheet.

6. Using a 16-ounce sample jar or large scoop remove the top 5-10 cm (2-4 in) of sediment from the location recorded in Step 6 above. Place the sediment in an 8 inch x 24 inch polyethylene bag or large, sturdy ziplock. You may need to take two scoops to get sufficient sediment, depending on the coarseness of the beach.
7. Walk ten paces (single steps) along the measuring tape, repeat the sediment scooping action, and place the sediment in the bag. Move an additional ten paces and repeat. Move an additional ten paces, approximately to the end of the tape, and repeat. The bag should now have sediment from four locations along the tape and be at least $\frac{1}{2}$ to $\frac{2}{3}$ full.
8. If additional transects, representing various tidal heights, along the beach are to be surveyed, place the sample bag in a cool, shady place and repeat the above procedures at these additional locations. If no additional samples will be taken, move on to wet sieving and winnowing the sample as described in the companion protocol “Procedures for recovering “winnowed light fractions” subsamples of forage fish egg-sized material from bulk beach substrate samples.”
9. If you have a camera, take several photos of the survey area showing sampling locations. Be sure to take photos from several perspectives (i.e., both up and down, as well as along, the beach). For each photo, record the cardinal direction you are facing on the data sheet in the comments field.

* Moulton, L.L., and Penttila, D.E. 2001. Field manual for sampling forage fish spawn in intertidal shore regions. Field Manual, MJM Research and Washington Department of Fish and Wildlife, Lopez Island, WA. PDF available on request from Dayv Lowry at WDFW (dayv.lowry@dfw.wa.gov).

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Field Observation Sampling Codes

Beach: Sediment character of the upper beach (particle size range in inches)

- 0 = mud (<0.0025)
- 1 = pure sand (0.0025-0.079)
- 2 = pea gravel (0.079-0.31, “fine gravel”) with sand base
- 3 = medium gravel (0.31-0.63) with sand base
- 4 = coarse gravel (0.63-2.5) with sand base
- 5 = cobble (2.5-10.1) with sand base
- 7 = boulder (>10.1) with sand base
- 8 = gravel to boulders without sand base
- 9 = rock, no habitat

Uplands: Character of the uplands (up to 1,000 ft from high water mark)

- 1 = natural, 0% impacted (no bulkhead, rip-rap, housing, etc.)
- 2 = 25% impacted
- 3 = 50% impacted
- 4 = 75% impacted
- 5 = 100% impacted

Landmark: landmark for determining sample zone where collection occurs

- 1 = down beach from last high tide mark
- 2 = up beach from last high tide mark
- 3 = down beach from second to last high tide mark
- 4 = down beach from upland toe
- 5 = up beach from waterline at the time noted

Sample Zone: Distance of sample zone transect parallel to the landmark, in feet to the nearest ½ foot. Used to determine the tidal elevation of the spawn deposit.

Tidal Elevation: Determined in the office using location and time data provided.

Smelt, Sand Lance, Rock Sole, Herring: subjective field assessment of spawn intensity apparent to the naked eye:

- 0 = no eggs visible
- 1 = very light, sparse
- 2 = light, but apparent
- 3 = light medium, visible
- 4 = medium, readily visible
- 5 = medium heavy, abundant
- 6 = heavy, broadly abundant
- 7 = very heavy, widespread
- 8 = eggs observed in the winnow

Width: Width of the potential spawning substrate band to the nearest foot. Judged by character of sediment and presence of spawn, when possible.

Length: Length of the beach up to 1,000 feet (500 feet on either side of the station). The value “C” may be assigned if surveyed beach is continuous with other potential sample sites.

Shading: Shading of spawning substrate zone, averaged over the 1,000 foot station and best interpretation for the entire day and season

- 1 = fully exposed
- 2 = 25% shaded
- 3 = 50% shaded
- 4 = 75% shaded
- 5 = 100% shaded